UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105-3901

June 4, 2018

Catherine Jerrard
Program Manager/BEC
AFCEC/CIBW
706 Hangar Road
Rome, New York 13441

RE: Review of the Final Pilot Study Implementation Work Plan for Operable Unit 2, Revised Groundwater Remedy, Site ST012, April 2018

Dear Ms. Jerrard:

EPA has conducted a technical review of the Final Pilot Study Implementation Work Plan for Operable Unit 2, Revised Groundwater Remedy, Site ST012, Former Williams Air Force Base, Mesa, Arizona (the Pilot Study WP), dated April 5, 2018. The Pilot Study WP represents the proposed final revision of the Addendum #2, Remedial Design and Remedial Action Work Plan for Operable Unit 2. The document was renamed as a Pilot Study WP as an outcome of informal dispute resolution, acknowledging an agreement requiring a pilot study to demonstrate within three years that Enhanced Bioremediation (EBR) can effectively remediate the remaining contaminants at the site to achieve the remedial action objectives (RAOs) within the 20-year timeframe specified in the 2013 Amendment to the Record of Decision.

The Pilot Study WP as proposed represents the first phase of a phased implementation of EBR, focusing on the initial injection phase. The Pilot Study WP allows for subsequent phase injection strategies to be developed during the Pilot Study, to be documented in report addenda or field variance memoranda, as noted in Section 3.2.2 (Phased TEA Batch Injections).

However, it is not clear that the agreements reached from the dispute resolution are fully captured and addressed in the Pilot Study WP. The Pilot Study WP states *"The Air Force will complete a Pilot Study Implementation Report within 36 months of the initial pilot study injections to evaluate EBR's primary goal (i.e., achieving groundwater cleanup levels in an estimated 20-year remedial timeframe specified in the 2013 RODA). The metrics and content of this Report will be developed during EBR with the goal of having an agreed upon framework amongst the BCT to evaluate EBR's primary goal."* It is not clear from this text if this Pilot Study Implementation report will be prepared by AF staff, the contractor performing the EBR injections, or a subsequent contractor, or how the efficacy of EBR will be evaluated. If preparation of the Pilot Study Implementation Report will be completed by a third party, it will be that much more critical that the objectives and decision logic for the Pilot Study be clearly specified in the Pilot Study WP.

Contingency Remedies

The dispute resolution stipulated that additional contingency remedies would be required if the three-year Pilot Study failed to demonstrate the ability of EBR to attain RAOs by 2033. The work plan does not specifically cover development of contingency remedies for consideration, as required by the dispute resolution agreement.

Plume Migration

As discussed during the May 17, 2018 BCT call, it is evident that we do not have a clear conceptual understanding of the hydrodynamics of the LNAPL and dissolved phase plume at ST12 Fuel Spill Site, now under high temperature as well as under a rising water table.

With the implementation of sulfate injection proceeding, a significant concern for EPA is preventing the offsite migration of contaminants and avoiding a down gradient groundwater plume directly in the path of the City of Mesa's new drinking water wells. We believe, as AFs modeling figures in the Pilot Study WP suggests, that the proposed injections will most likely increase the mobility of contaminants in the future. Although AF maintains that perimeter monitoring wells still suggest plume stability, EPA remains concerned that AF has not developed specific plans for plume containment nor established monitoring criteria to trigger contingency plans for plume containment. Without a formalized plan in place for plume containment, after the current contract expires there could be a substantial contractual delay preventing AF from responding to plume expansion in a timely manner. *Therefore, EPA maintains the environmental indicator status for ST12 as "groundwater migration not under control", because there are no formal plans in place to prevent migration of contaminants.*

Additional Concerns

Substantial comments remain on the workplan. In general, the remaining concerns fall into the following categories, as summarized below:

A. The planned injections of sulfate as a terminal electron acceptor (TEA) have the potential to worsen ground water conditions at the site by:

1) displacing LNAPL and dissolved phase contaminants causing them to migrate and spread.

2) greatly increasing the Total Dissolved Solids (TDS) and sulfate concentrations on site and down-gradient.

3) increasing arsenic concentrations above drinking water maximum contaminant levels (MCLs).

4) generating hydrogen sulfide gas and potentially hazardous conditions for which the work plan provides no mitigation plan for response beyond adjusting the injection rate.

B. The planned injections may not provide the needed benefits at the site due to:

1) the extremely large mass of LNAPL and benzene estimated to remain in the subsurface, and the 100-200 year timeframe previously estimated to achieve RAOs via biodegradation.

2) the presence of an LNAPL smear zone across three hydrogeologic units spanning an 80-foot zone of saturation, which will likely hinder the dispersal of sulfate.

3) biofouling of wells impeding distribution of sulfate.

4) injections of sulfate at high concentrations may suppress the microbial populations intended to be enhanced.

5) inadequate demonstration that sulfate depletion and useful rates of biodegradation are currently occurring at the site in areas that already have optimum naturally-occurring sulfate concentrations.

6) it has not been demonstrated that the necessary microbial populations to be enhanced are currently present at the site after it has been heated to boiling temperatures.

C. The monitoring program as proposed in the Pilot Study WP may not provide the necessary data to substantiate any conclusions due to:

1) inadequate baseline data on microbial populations, LNAPL and dissolved phase contaminants of concern (COCs), TDS, sulfate, arsenic for comparison to be able to evaluate progress or changing conditions over time.

2) inadequate and insufficient monitoring network in terms of sampling locations within the treatment zones, and sampling frequency to detect and interpret changing parameters over time.

3) incomplete, vague and ambiguous decision criteria.

4) unverified and unvalidated modeling and assumptions that were admittedly not intended to be used for predictive purposes.

5) lack of clarity in how of achievement of RAOs within 20-year time frame will be demonstrated.

There also remain substantial comments specifically relating to design, operational, sampling and quality assurance issues. We are very concerned that as there are no formalized plans for plume containment, the intentions and objectives of the proposed sulfate injection remain ambiguous. It is not clear from the Work Plan if AF intends to allow contaminants to migrate off site.

Our detailed comments discussing the items summarized above are included in the attached memoranda prepared by EPA's National Risk Management Research Lab as well as EPA's contractor, Techlaw. Although AF has declared this to be a final document, we find the Pilot Study WP insufficiently detailed to implement in its current form.

If you have any questions regarding these comments, please contact me at (415) 972-3150.

Sincerely,

Carolyn d'Almeida

Carolyn d'Almeida
Remedial Project Manager

REFERENCES:

Performance Monitoring of MNA Remedies for VOCs in Ground Water EPA/600/R-04/027, National Risk Management Research Laboratory Office Of Research And Development U.S. Environmental Protection Agency, Ada OK, 2004

Suthersan, et.al. *Engineered Anaerobic Bio-Oxidation Systems for Petroleum Hydrocarbon Residual Source Zones with Soluble Sulfate Application,* Ground Water Monitoring & Remediation 31, no. 3/ Summer 2011

Monitoring the Impacts and Effectiveness of Electrical Resistance Heating with Enhanced Bioremediation Microbial Insights Webinar presentation: https://www.microbe.com/webinars/

cc: Wayne Miller, ADEQ
Phil Mook, AF
Angeles Herrera, EPA
Tina LePage, ADEQ